Lecture Notes in Educational Technology

Christina Hong
Will W. K. Ma *Editors*

Applied Degree Education and the Future of Learning

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Lecture Notes in Educational Technology

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Preface

Applied Degree Education and the Future of Learning

As an unprecedented single event, the global pandemic wrought by the COVID-19 coronavirus disrupted the world for longer than anyone might have envisaged.Globally, the pandemic disrupted sectors in catalytic ways, catapulting digital transformation across industries, workplaces, and workforces. In its eventual aftermath, the full social and economic impact of COVID-19 may not be fully realized for years to come. An Australian report highlights the intensity of the shift:

> *Some refer to it as the double disruption, the convergence of digital transformation and the global pandemic which together, have accelerated the adoption of technology at a speed none of us thought possible. In a matter of months, businesses have leapt ahead years in their digital journey. How we work, when we work and where we work are all being redefined. (Digital Transformation Expert Panel, 2020)*

In the education sector, from compulsory to post-compulsory education, across preschool, schools, universities and professional education providers, COVID-19 sent shockwaves that also forcibly redefined our approaches to learning and teaching almost literally, overnight. Over successive periods, the ebb and flow of COVID-waves demanded operational risk management, resilience and flexibly responsive preparedness from leaders and their management teams. Most revealing of all, it required just-in-time solutions, to enable learners and teachers to continue with their educative processes in the face of lock-down and amid often inequitable access to technology and Wi-Fi bandwidths.

The pandemic significantly impacted the higher education sector globally. Moreover, the impact of the pandemic on international student mobility led to significant number of students unable to travel or enter country borders. The consequent drops in international student revenues and consequent domino-effect on institutional sustainability resulted in retrenchment and cost-cutting in those institutions with a traditionally high reliance on in-bound international student numbers.

Turning Adversity into Advantage

As we emerge out of the worst of the pandemic and progressively transition to the 'next normal', what are the innovations and shifts being made by educators, institutions and agencies that are likely to transform the future of learning? As economies gear-up, re-establish and look to accelerate in the wake of COVID-19, the demand for a highly skilled and technologically adept workforce is expected to increase: How is the applied degree sector responding to this demand? What are the biggest challenges and opportunities for institutions and how are leaders now planning to navigate the future? How is the applied degree sector responding to the need to up-skill and re-skill disenfranchised workers?

The pandemic taught us that the physical, in-person experience of campus-based life is important in building human connection and social cohesion. That practical hands-on learning, the essential element of applied degree learning and teaching, while possible to virtually simulate, is no replacement for real-world authentic learning and teaching engagement. Moving forward, digitalisation will remain a key component of higher education. Given the rapid technological acceleration that has occurred in the education sector and across industries and the world of work, what indeed is the 'next normal' for applied degree learning and teaching? What changes to the traditional paradigm will need to be enabled to optimize student access, engagement, and success? How are local and global themes such as sustainability, innovation and technology, entrepreneurship, and the need for future ready skills and multiliteracies be integrated into curricula and institutional agendas? What does the future of learning look like and how is it the same or different from what we know now?

Outline of the Book

In this edition we seek to involve academic and practitioners to share case studies, engage in critical discussion and spearhead thought leadership.

The book starts with an introductory chapter, and it is then divided into four parts, including: Part I: *Future ready values and competencies for the future of learning*; Part II: *Innovative pedagogies in applied degree learning and training*; Part III: *Driving student access, engagement, and success through digital technologies*; Part IV: *Lifelong learning, partnering and the future of work*.

The Introductory chapter is entitled, *The Case for Applied Degree Education: The Future of Learning for the New World of Work*. This chapter discusses and defines the applied degree sector on its social and economic value as it delivers professionally orientated skilling, upskilling and reskilling solutions for the emergent future of work. The chapter further proposes that the applied degree sector will need to work in closer partnership with their industries and professions adopting an ecosystem approach to

ensure the applied knowledge, advanced skills currency, and global relevance of their work ready, future ready graduates.

Part I: *Future ready values and competencies for the future of learning* is divided into seven chapters. *Preparing Engineers for 2035: Transforming Australia's Engineering Education for Emerging Roles and Expectations* discusses the Engineering 2035 project as proposed by the Australian Council of Engineering Deans to reshape Australian engineering education for future professional engineering graduates. *A New Norm of Learning: Accommodating 21st Century Learners' Needs*, through comparison and analysis of various curricula,argues the case for interdisciplinary curricula that can be delivered cross-institutionally, enabling flexible online learning with self-selected courses to suit individual student's specific needs. *The Structure of Domain-specific Competence in the Occupation of Technicians at Vocational Schools in Germany* focuses on the structure of domain-specific competence in the occupation of technicians at vocational schools in Germany.*Futures Literacy: The Concept and Potential Application in Applied Degree Education* reviews the concept of futures literacy and analyzes its applicability to English language curriculum design in the context of tertiary-level applied degree education.*Creativity under COVID-19: How technology has enhanced and promoted student engagement online* examines how features such as chatrooms and share-screens in selected video-conferencing tools enhance the hybrid mode of teaching and learning in the context of creativity and how technology has enhanced online student engagement in the said context. *Competency-based Workplace Learning and Assessment: A Framework and Models for Future Research* presents a framework for the assessment of workplace learning by empirical method based on research and upon experiences of vocational training in Workplace Learning and Assessment (WLA) implementation.*Embedding Uncertainty in the Learning Process—An Evaluation Case-study of VUCA Model in Education* discusses the VUCA environment: Volatile, Uncertain, Complex, Ambiguous and evaluates how the principles of VUCA can be applied in learning environments from the perspective of four design elements (epistemic, instrumental, and spatial, social, and temporal).

Part II: *Innovative pedagogies in applied degree learning and training* is divided into eight chapters. *Remote Teaching and Learning in Applied Engineering: A Post-Pandemic Perspective* provides a rationale for a variety of course delivery models at various stages of the pandemic and highlights the approaches to overcome some of the pressing challenges of remote education. *Applying Hybrid Mode in Different Pedagogical Approaches on Design-related Tertiary Education Programmes in Hong Kong* investigates the learning experiences and challenges of design students under hybrid teaching mode.*An Investigation of Using Blended Learning Pedagogy to Sustain Student Interest in Basic Science Subjects* presents current practice and evaluates the effectiveness of blended learning activities to enhance students' engagement and motivation in learning science.*Budding the Next Entrepreneur in the Applied Learning Education* describes two successful case examples of how technology is used, applied, and backbones innovation projects completed by Final Year Project (FYP) students. *Does online practice based on an adaptive curriculum work better than written feedback for EAP?* examines the impact of feedback in

teaching English for Academic Purposes (EAP). Findings suggest that the use of rubrics, adaptive curricular and the role of practicing "positioning" are recommended. *Improving Students' Learning Experience Using Simulated Environments in Applied Degree Education in Architecture, Engineering, and Construction* introduces several approaches in creating simulated environments for applied degree programs, including Virtual Reality, Augmented Reality, Mixed Reality, and the A Real Organization Unit Simulated as Life system, to improve the student learning experience. *Developing an Online Practicum in Professional Education: A Case Study from UK Teacher Education* presents a case study of the transition to a fully online practicum for UK university students training to be teachers. The evaluation suggests that online supervision requires participants to work harder to establish a positive working alliance and sense of belonging across time-space-digital media. *New Intervention Strategy in Teaching and Learning under Covid-19 Pandemic: Nursing Simulation on Health Worker Training in Tertiary Education, Hong Kong* evaluates the effectiveness of using nursing simulation as an alternative mode to replace on-site fieldwork placement in health worker training.

Part III: *Driving student access, engagement and success through digital technologies* is divided into eight chapters. *A Reflection Case to Covid-19 Pandemic: Online Learning Experience* explores the shift to online learning during the coronavirus epidemic and attempts to identify roadblocks and hurdles in the process. Six major themes are identified: online learning experience; support; engagement; group work; time; and assessment. *Product Design Education in the wake of COVID-19: New Technologies Enabling Experiential Learning Relevant to Future Practices* discusses a university-industry collaboration (UIC) research project in Product Design subjects. The case analysis identifies a convergence of innovative technologies; new ways to optimize student engagement and the development of future ready skills. *How do Moroccan Higher Education Students Behave during the Remote Education in Time of COVID-19?* assesses how Moroccan higher education students behaved during the transition from face-to-face education to a complete remote education.*Technology-Enhanced Student-centric Learning in Information and Multimedia Technologies in the New Normal Era* proposes a deconstructed teaching strategy with virtualized practical sessions to maximize the understanding of the practical implementation.*Enhancements of Vocational Students' Engagement of Workplace Learning in the Industry-university Collaboration Learning Environment: A Case Study in the Greater Bay Area* investigates vocational students' engagement in work-based learning from an industry-university collaboration perspective to enhance the students' professional skills in dynamic situational work contexts. *Engaging Students through Technology-enhanced Interactive Activities Outside the Classroom* reports on the adoption of different technology-enhanced interactive activities in a database subject.*Reflexivity on Delivering Experiential Learning before and since Coronavirus Pandemic* offers an autoethnographic and reflexive account on delivering experiential learning in higher education in Hong Kong.*COVID-19 and Contactless Learning and Teaching: The Impact of Active Participation and User Acceptance* analyzes the impact of contactless learning and teaching. A mobile app integrated with iBeacon technology was developed to deliver learning materials.

Part IV: *Lifelong learning, partnering and the future of work* is divided into six chapters. *Making Connections Between Work and Study—Maximising the Value of Degree Apprenticeships* discusses contemporary degree apprenticeships which blend practical skills-based elements with a recognized course of academic study.*Re-engineering the Food Industry: Where do We Go from Here?* discusses the importance of the discipline of food engineering as a change agent for the future of the universal food industry and the need for a re-engineering of food education. *The Relevance of Applied Education to Urban Sustainability: A Case Study of a Degree Programme in Horticulture, Arboriculture and Landscape Management in Hong Kong* examines the challenges and opportunities in implementing an existing vocational degree program and its transformation into an applied degree. Knowledge classification, workplace training and the cultivation of transferable skills at individual, program, industry and social levels are discussed. *From Deindustrialization to Reindustrialization: A Repositioning of Vocational Education and Training for Improving Synergy and Connection within the Social Structure in Hong Kong* argues that the Vocational and Professional Education and Training (VPET) initiative should become a new paradigm for incorporating the strategic planning of STEM with digitalization and craftsmanship as innovative features to better promote VPET in Hong Kong. *Globalisation and the Massification of Higher Education in the Hong Kong Context: Dealing with the Challenges of Globalisation* considers the impact on educating a workforce suitable for the much-touted knowledge-based economy through the review of past and current research covering the subject matter. *Facilitating Transformational Change in Applied Degrees in Engineering: A BRAVE New World* introduces a transformational model of applied engineering education, the BRAVE Model, incorporating five distinct concepts, Belonging, Relationships, Authenticity, Variety and Employability. *Foregrounding Design Thinking in Project-based Learning amid the Transition to the New Normal*, based on the five-stage model of Design Thinking, highlighting how non-linear Design Thinking can engage students in multidisciplinary partnerships with different stakeholders.

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Reference

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About the Editors

Prof. Dr. Christina Hong, Ph.D. is the President, Technological and Higher Education Institute of Hong Kong (THEi). Christina has a strong background in educational management and leadership with an emphasis on organizational change management, curriculum transformation, technology enhanced learning, and teacher praxis across the school, VET and higher education sectors. Christina's prior roles include senior executive roles in the TAFE and university sectors in Australia as well as national educational reform and tertiary education leadership roles in New Zealand. Christina is particularly interested in how tertiary institutions foster C21st employability skills, the dynamic of innovation ecosystems and collaboration through internationalization and applied research activities. She is highly sought after as an international consultant and speaker, including, Hong Kong SAR and Greater Bay Area (China) technology innovation Ed-Tech start-up panels, UNESCO global projects and APAC education forums. Christina initiated the International Conference on Applied Education, Technology and Innovation (AETI) in 2019, and with Dr. Will Ma has co-edited two thematic publications: Applied degree education and the future of work (2020) and this current edition.

Will W. K. Ma, Ph.D. is the Head of the Learning Commons & Digital Innovation, Technological and Higher Education Institute of Hong Kong (THEi). The Learning Commons & Digital Innovation is responsible for providing physical learning space, information technology services, physical and online learning resources for staff and students to promote applied research and to enhance learning. He is the Chairman of the Learning & Teaching Committee and is a champion of staff development, especially in technology-enhanced learning. Dr. Ma's research focuses on the use of information systems for communication, knowledge sharing and knowledge creation. He has publications in *Computers & Education*, *Computers in Human Behavior*, *Journal of Computer Assisted Learning*, *International Journal of Communications, Law and Policy*, and *Information & Management*. He is co-editor of the Journal of Communication and Education (2015–Present), and editor of Cogent Social Sciences, Taylor & Francis Online (2017–2019). He is the Editor of Springer's *Educational Communications and Technology Yearbook* series.

Chapter 1
The Case for Applied Degree Education: The Future of Learning for the New World of Work

Christina Hong

Abstract As the higher education sector transitions, post the disruption of the global pandemic to the 'next normal', this chapter contends that the applied degree sector will increasingly add social and economic value as it delivers professionally orientated skilling, upskilling and reskilling solutions for the emergent future of work. With the advent of Industry 4.0 and as new technologies, rapid digitalization and automation are increasingly embedded across all areas of life, the new workforce will rapidly require more advanced technical knowledge, skills and attitudes. Investment in digital skills comprising a combination of skillsets that make workers adaptable to technological change along with the essentially 'human' DELTA qualities and skills will be necessary. The applied degree sector will need to work in closer partnership with their industries and professions adopting an ecosystem approach to ensure the applied knowledge, advanced skills currency and global relevance of their work ready, future ready graduates.

Keywords Applied degree education · Industry 4.0 · Education 4.0 · The future of jobs · The new world of work

1.1 Introduction

There is a Chinese proverb that goes, *a crisis is an opportunity riding a dangerous wind.* Given the experience of the global pandemic, the sentiment expressed in the proverb seems particularly pertinent. The pandemic plunged education sectors across the globe into a state of crisis, forcing institutions to either quickly and flexibly adapt and adopt new ways of working to ensure continuity of learning and teaching provision. Or alternatively, to suspend all learning and teaching for an indefinite and ultimately, unsustainable period. Across education sectors, and more specifically in relation to the higher education applied degree sector, apropos the context of this chapter, institutions and schools were fortunately able to respond and pivot

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to online and remote learning and teaching. The pandemic has propelled us into 'unprecedented' times and consequently accelerated the uptake of digital learning and teaching, just as it has served to accelerate the digital transformation of work, workplaces and industrial and professional settings. As Gallagher (2021) in *Peak Human Workplace: Innovation in the unprecedented era* states:

> We are living and working in the 'unprecedented era'. It is extraordinary not only for the scale and gravity of the mega challenges we face, including climate change, a global pandemic and globalisation – for the world has faced similar trials before. It's when these challenges combine with the profound transformation of the economy and society by digital technologies that we find ourselves in an era without precedence. (p. 4)

As the world gradually turns towards the 'next normal' and we critically reflect on the exigencies of Education 4.0 and the reindustrialization focus of Industry 4.0, in tandem with the learnings from the pandemic, there is a window of opportunity for the vocationally orientated professional higher education sector, to re-think, reimagine and re-set our education and training approaches. We must take cognizance of these new realities to ensure that our graduates are prepared and ready for the shifting new realities of the future of work. The *opportunity* that has ridden along on the back of the danger wrought by the COVID-19 crisis lies arguably, in this critical transformation.

Commentators have long contended that the educational paradigms of the last century are no longer fit for purpose for *this* century. According to the OECD *2030 Future of Education and Skills Project* (2019a) there is a need to replace old education standards with an educational framework that combines knowledge with the twenty-first century skills of creativity, critical thinking, communication and collaboration. The World Economic Forum (2020a) also echoes this sentiment: 'There is an urgent need to update education systems to equip children with the skills to navigate the future of work and the future of societies' (2020a, p. 26). The school-based teaching and learning approaches of the industrial age *sic* transmission teaching and rote learning, albeit still practiced in some jurisdictions, or the mass lecture modes of higher education are no longer wholly sufficient nor digitally progressive enough to meet the demands of delivering twenty-first century learner outcomes. The OECD's Learning Compass 2030 describes *skills* as 'the ability and capacity to carry out processes and be able to use one's knowledge in a responsible way to achieve a goal,' and distinguishes three different types of skills: cognitive and metacognitive; social and emotional; and practical and physical (OECD, 2019b). The skills and competencies required in the twenty-first century enabled by the characteristics of Education 4.0, therefore require a quite different (and to the extent that educational technologies continue to evolve and advance) emergent set of learning and teaching approaches supported by increasingly sophisticated digital toolkits.

1.2 Education 4.0

Education 4.0 refers to the shifts in the education sector in response to Industry 4.0 where digital transformation is impacting the ways in which the world of work and everyday lives are becoming increasingly automated. The World Economic Forum (WEF) *Schools of the Future Report* (2020a) identifies eight critical characteristics to equip young people in school systems with the skills to inhabit a more inclusive, cohesive and productive world. Namely, global citizenship skills, innovation and creativity skills, technology skills, interpersonal skills, personalized and self-paced learning, accessible and inclusive learning, problem-based and collaborative learning and life-long and student driven learning. Similarly, these characteristics prove relevant and attributable to Education 4.0 in response to Industry 4.0—in the context of high-quality applied degree learning experiences. Industry 4.0 and the adoption of automation and digitization including new technologies such as artificial intelligence (AI), Augmented Reality (AR) Virtual Reality (VR) and Mixed Reality (MR), big data and the Internet of Things (IoT) require new workforce competencies and capabilities.

Moreover, Education 4.0 and the future of work relies much less on *what* you know (in conceptual and theoretical terms) and much more on *how* you can demonstrate not only the synthesis and application of knowledge and skills, but also inter-operably, the integration of this synthesis in relation to the relevant new technologies in the industrial or professional field. This increasing focus on 'real-world' integration of theory and practice echoes as previously referenced, (Hong & Ma, 2020) the insights from the 2019 World Economic Forum on the *Future of Work*. Experts at Davos included the CEO of IBM, Ginni Rometty, who called for the development of a new career and education model, which she deems, '*new collar, not blue collar or white collar*' and one that requires investment in skills development and responsivity in real time to the changing skills landscape. It is this 'new collar' and focus on advanced skills application and the imperative to up-skill and re-skill, to unlearn and relearn, that is driving a stronger applied educational paradigm that more than ever before heralds the relevance and significance of the applied degree to the new economy.

1.3 Future of Jobs and the New World of Work

The World Economic Forum (2020b) released its third edition of the *Future of Jobs Report* in October 2020. The Report iterates that what used to be considered the future of work, i.e., increased automation and digitization has already happened. The global pandemic catalyzed rapid digital acceleration across almost all facets of life and professional work and increased the uptake of automation across industries. The Report anticipates that by 2025, automation and the new division of labour between humans and machines will disrupt 85 million jobs globally. This rate of displacement has been signaled over time, however, as a corollary, the Report also

anticipates an upside. As the economy and job markets evolve, 97 million new roles will also be created that leverage and take advantage of distinctive human skills. These include tasks such as managing, decision-making, communicating and interacting. It is projected that 50% of those set to stay in their current roles in the next five years will need to undergo a transition process through upskilling and reskilling to more sustainable job opportunities. An imperative that needs to be urgently addressed by nations at both scale and speed.

More recently, research by the McKinsey Global Institute (Dondi et al., 2021) identifies that while manual skills will decline, the demand for technological, social and higher cognitive skills will increase. The McKinsey research goes further to define what skills are required to future-proof citizens for the future of work through identifying a set of 56 foundational skills associated with a higher likelihood of employment, stronger incomes and job satisfaction. These foundational skills fulfil the three criteria that will benefit all workers, regardless of the sector in which they work (Dondi et al., 2021, p. 2):

- Add value beyond what can be done by automated systems and intelligent machines
- Operate in a digital environment
- Continually adapt to new ways of working and new occupations.

The 56 foundational skills, are called DELTAs because they comprise both skills and attitudes are clustered into 13 skill groups and four categories comprising: Cognitive—critical thinking, planning and ways of working, communication, mental flexibility; Interpersonal—mobilizing systems, developing relationships, teamwork effectiveness; Self-leadership—self-awareness and self-management, entrepreneurship, goals achievement; and Digital—digital fluency and citizenship, software use and development, understanding digital systems (Dondi et al., 2021, p. 3). As a result of a psychometric online survey conducted with eighteen thousand people from 15 countries, the outcomes of the McKinsey research include the identification of current state proficiencies and the ranking of the top 3 DELTAs which are likely to predict better outcomes for employment, higher income and job satisfaction. Proficiency in synthesizing messages, coping with uncertainty and adaptability are the top three DELTAs relating to Employment. Self-confidence, work-plan development and organizational awareness are related to High Income. Self-confidence, coping with uncertainty and self-motivation and wellness are the top three relating to Job Satisfaction (Dondi et al., 2021, p. 10).

The McKinsey researchers contend that these findings have the potential to help shape the future of education and adult training and make three recommendations for governments to consider in: (1) reforming education systems with more curricula focus on the DELTAs; (2) reforming adult-training systems, again with a focus on the DELTAs and (3) ensuring affordability in life-long education to enable on-going attention on the DELTAs.

> Hence, just as the Industrial Revolution in the 19th century drove an expansion of access to education, today's technological revolution should drive further expansion to ensure universal, high-quality, affordable access to education from early childhood to retirement

> and to ensure that curricula include the DELTAs that will future-proof citizens' skills in the world of work. (Dondi et al., 2021, p. 11)

Mention of the nineteenth century industrial revolution and today's technological revolution, reminds us again of the pressing need to shift mindsets and approaches from what was then to what is now. As we re-think, re-imagine, re-set and transition to opportunities post-COVID, how relevant is the applied degree sector to the demands of this re-emergent post-COVID world? What is the value proposition that the applied degree education sector offers?

1.4 Addressing Employability Gaps and Skills Shortages

Once-upon-a-time, gaining a bachelor's degree, securing initial employment with the expectation of gaining promotion(s) and perhaps moving to a few other same sector jobs over a lifetime of work was sufficient for career success. With the rise of automation, AI, AR, VR, MR, big data and IoT, this 'last century' mindset will no longer suffice. Just as flipped learning has disrupted more traditional pedagogical approaches, so the traditional mindset of education-employment-career has been flipped on its head.

Moreover, the emergence of the knowledge economy has witnessed the driving of globalisation, marketisation and massification as higher education trends. The setting of widening participation targets for higher education has for example, led to an increasingly larger number of degree-level admissions and consequent increase in degree-level graduates entering the workforce. Such that there is now an oversupply of graduates in respective markets. Indeed, not only is there an oversupply of graduates, but there are skills discrepancies aka *skills gaps* identified between university graduate outcomes and the employability requirements of the industry or profession. As graduates struggle to find employment relevant to their areas of degree study, there is increasingly a *skills mismatch*, where degree graduates are employed in jobs requiring lower skill levels. The Boston Consulting Group, in a publication entitled, *Fixing the skills mismatch* (Puckett et al., 2020) remark that 'the *skills mismatch* is much less obvious than the skills gap, because it creates an illusion of employment and economic and social stability.' Increasingly, countries across the globe are experiencing a glut of over-educated and under-employed degree graduates. Headlines such as the following reveal this phenomenon: *South Korea's latest export: Jobless graduates* (Yang & Kim, 2019), *Does Australia have too many graduates?* (Go, 2021); *Are we producing too many graduates?* (Philabaum, 2015: LinkedIn), *University graduates face tough competition and low salaries as they enter Hong Kong's crowded workforce*, (Ng & Choi, 2019).

Amidst this context of an under-employed and over-qualified workforce, there is ironically, a global shortage of skilled talent, particularly in industries that are acknowledged to be strong economic drivers. An extensive Korn Ferry Report (2018) as part of their *Future of Work* series, finds that by 2030, more than 85.2 million jobs,

at an estimated value of $US8.452 trillion (Korn Ferry, 2018, p. 4) could go unfilled due to unmet talent supply across industries and continents. The report, *Future of Work: The Global Talent Crunch* examines talent supply and demand in 20 economies across the world in three broad industries: finance and business services; technology, media and telecommunications; and manufacturing.

The Report finds that by 2030, the global financial and business services sector is likely to face a labor skills shortage of 10.7 million workers and unrealized output of $1.313 trillion. Specific mention is made of small but strong economies like Hong Kong and Singapore, noting that they 'have limited opportunities for expansion, so upskilling the existing workforce is critical. Human resource development holds the key both to economic development and reducing the inequality by enabling local populations to achieve their potential', (Korn Ferry, 2018, p. 15). India is the only country expected to have a surplus of highly skilled (i.e., degree level) financial and business services labor by 2030. Talent shortages in the technology, media and telecommunications (TMT) sector is also acute, with a shortage of some 4.3million workers and unrealized output forecast of $449.70 billion. Likewise, the manufacturing industry is forecast to experience a labor skills shortage of 7.9 million and unrealized output forecast of $607.14 billion. In summary, the Report finds that:

> Acute global talent shortages are clearly a looming threat, and they're driven by a shortage of skills rather than a shortage of people …While technology will reshape the future of work, organizations will be unable to leverage it without the right talent. It is only through the partnership of people and technology that the full potential of both can be realized. To secure their future, companies must look to address the talent crunch now. (Korn Ferry, 2018, p. 42)

In 2020, UK Prime Minister, Boris Johnson, acknowledged that the coronavirus pandemic had exposed the "shortcomings" of the UK's educational system and pledged to ensure there was "life-long" skills retraining opportunities. Moreover, he is quoted as saying that there are too many university graduates with degrees that do not get them the jobs they want. Johnson pledged to end the 'pointless, nonsensical gulf' between the 'so-called academic and so-called practical varieties' of education. Declaring that 'Now is the time to end the pompous, snooty and frankly vacuous distinction between the practical and the academic.' In acknowledging the skills shortage in the IT field, the UK Prime Minister also identified a shortage of UK-trained lab technicians as well as skilled construction workers, mechanics and engineers. (Sleigh, 2020). This dawning realization by a world leader of the imperative to shift the focus in higher education to more applied education and skills-based learning, including clear linkages to the needs of industries and professions in addressing the demands of new workforce requirements, is also being acknowledged in other parts of the world where hitherto, applied education and the vocational and professional education and training sector has neither been as well integrated nor as highly valued as the university education sector.

Indeed, as the enhanced focus on technological advancement and greater impetus to provide graduate employment outcomes has occurred, the convergence and consequent blurring of boundaries between the traditional academic and vocational sectors has become increasingly evident. The traditional bifurcation of vocational education

and training and university higher education in many countries is giving way to the building of more permeable and complementary tertiary systems. This is exemplified by the *dual sector* education offered most prominently by colleges, institutes and universities in Australia, New Zealand, the United Kingdom and parts of Europe, namely Austria, Germany and Switzerland. Reform agendas in the vocational and higher education space,—a long awaited renaissance of sorts, with the aim of clarifying and strengthening outcomes for students, employers and the economy at large is currently being driven in several countries.

1.5 Applied Degree Education

This situated cognition around the systemic positioning and value of applied learning and in particular applied degree education is globally varied. The education systems in parts of Europe, namely, Switzerland, Germany and Finland, would perhaps exemplify best practices in this regard. In the Preface to *Vocational and professional education and training in Switzerland* (Strahm et al., 2016) the authors and publishers remark on the trend towards university education as an academic education and emphasize the need for scrutiny based on two rationales:

> Firstly, the university education path very often qualifies and educates young people further away from the requirement of the labour market. Secondly, most of the full- time school (i.e., university) education path tends to neglect the practical human qualities similar to the qualification of practical and emotional intelligence, reliability, accuracy, precision and responsibility. (Strahm et al., 2016, p. 13–14)

Switzerland has traditionally had one of the lowest rates of youth unemployment in the world coupled with a strong competitive economy. As of June 2021, Switzerland was placed first in the IMD World Competitiveness ranking which ranks 64 economies and assesses the extent to which the country promotes the prosperity and social cohesion of its people, including such qualities as investment in innovation, digitalization, welfare benefits and leadership. According to the OECD, Switzerland is expected to be one of the countries to make a strong economic recovery as the pandemic eases. The Swiss dual-track education system has an enviable globally recognized reputation and is premised on the concept of *vertical permeability*, where every qualification staircases to and allows for further professional education or specialization at a higher level. The country's success has been attributed to not only the dual track education system, but also the dual track apprenticeship system:

> In Switzerland, the dual-track system of vocational and professional education and training (VPET) with its specially developed apprenticeship programme is a central pillar and solid driver of the Swiss economy and Swiss society. (Strahm et al., 2016, p. 138.)

Similarly, the German system of vocational education and training (VET) has a long tradition of providing a dual system apprenticeship and dual-track VET model where, 'highly standardised and stratified educational and occupational routes

and formal qualifications ensure a tight coupling between skill formation and occupational labour markets' (Haasler, 2020, p. 68).

VET in Finland is held in high regard with close to 50% of young people applying for vocational upper secondary studies after the completion of basic education. Nine out of ten Finns believe that VET offers high quality learning with strong working life orientation. Characteristics of the VET system in Finland includes: a broad outcomes-based approach and work-based learning with well qualified teachers, strong employment prospects, eligibility for further studies, flexible learning pathways and a modular qualifications structure that considers lifelong learning skills. Finland has two types of higher education institutions: universities and universities of applied sciences (UAS). English-taught degree programmes are offered at bachelor's and master's level and have strong ties with working life and regional development. An interesting 'fun fact' is that Finland has more UAS than it has the 'traditional' university. The Finnish higher education sector has 13 universities whereas there are 22 UAS. Moreover, numbers are increasing in the UAS sector, with Statistics Finland reporting a 4% increase in 2020, this equates to around 133,000 more students working towards a UAS degree as compared to the prior year at bachelor's, master's and doctoral levels (Statistica, 2020).

In many parts of the Asia–Pacific, countries are strategically realigning, investing and reforming post-secondary higher education systems with a greater focus on the development of applied skills and lifelong learning. Singapore, for example, has instigated Skillsfuture (https://www.skillsfuture.gov.sg/) a national movement to drive the development of an advanced economy and inclusive society through supporting Singaporeans to develop their skills mastery. Individuals are encouraged to take ownerships of their skills development and the pursuit of lifelong learning, enabled by Skillsfuture initiatives, including incentives such as, Skillsfuture monetary credits claimable against a wide range of eligible courses and industry transformation maps. From a higher education system point of view, the Singapore Institute of Technology (SIT) was privately established in 2009 and identified as an autonomous university in 2014, allowing the SIT University of Applied Learning to confer its own degrees. The number of students at SIT have grown from 500 in 2009 to over 7,000 across 42-degree programmes as of 2019. Similarly, UniSIM was initially established as a private university in 2006, then subsequently restructured into the Singapore University of Social Sciences (SUSS) and brought under the ambit of the Singapore Ministry of Education in 2017. As the country's 6th autonomous university, SUSS has a particular remit to support lifelong learning for initial degree students as well as for working adult and mature learners in the social sciences.

China is also undergoing significant reform as it looks to further accelerate digital transformation and address the challenges of the skills mismatch and the skilling and reskilling agenda. With the aim of transforming its education and skills development to deliver the talent needed for an innovative, digitized, post-industrial economy the Central Government has set in motion a timely, transparent and actionable agenda through policy proclamations in recent years. On 29 September 2020 nine Chinese government bodies including the Ministry of Education (MoE), and Ministry of

Human Resources and Social Security (MoHRSS) released the Vocational Education Quality Improvement Action Plan (2020–2023).

This Action Plan contains the broad coordination of goals for China's vocational education sector for the next three years as part of the Implementation plan on National Vocational Education Reform (Vocational Education Reform Plan), announced in February 2019. China's reform plan for vocational education to cultivate high-quality workers and technical personnel includes the establishment of 50 high-level advanced vocational schools with 150 key majors by 2022. A national standard system of vocational education that covers most industries and meets international advanced levels will be also created. The reform plan also encourages universities and enterprises to work together to promote training through the construction of a number of high-level training bases. The action plan also proposes the full roll out of school-based modern apprenticeships and Enterprise New Apprenticeships targeted at training within enterprises. Interestingly, the reform action plan also encourages the piloting of vocational education at bachelor's degree level offered by *vocational universities*. It also encourages competent higher education institutions at bachelor's level to transform into application orientated institutions, aka Universities of Applied Science, to deepen institution-enterprise integration and produce high-level skills workers (http://en.moe.gov.cn/).

Anticipating this trend, the Shenzhen Technology University (SZTU) was officially approved by the Ministry of Education in November 2018, to meet urgent demand from the advanced manufacturing industry locally and nationally. SZTU is exploring a new mode of 'university education + enterprise internship + engineering projects' to address the shortage of '*high-level innovative applied talents.* As a further advancement, a news item in the South China Morning Post, entitled *China's* 'MIT of Greater Bay Area' is a bid to turn southern region into innovation powerhouse' (Guo, 1st August, 2021) reports that as part of an ambitious plan for the Greater Bay Area (GBA), linking the cities of Hong Kong, Macau, Guangzhou, Shenzhen, Zhuhai, Foshan, Zhongshan, Dongguan, Huizhou, Jiangmen and Zhaoqing, a new university is being planned for Dongguan, opening in 2023 with a focus on science and technology to enhance the region as an economic and business hub.

In Hong Kong SAR, the greater recognition of the term *applied education* and in particular applied degree education and its distinguishing characteristics is gaining momentum. A 2018 study by McKinsey Company, observed that the Hong Kong education system is not meeting the needs of employers and identified a gap between the expectations of young employees and that of the employers. Joe Ngai, managing partner for Greater China at McKinsey and Company, as quoted in a South China Morning Post article remarks that:

> Hong Kong parents tend to encourage their children to take on education and training to become bankers, accountants and lawyers. And while these careers are vital for Hong Kong as a leading financial and banking centre, the city does not have many youths engaged in engineering, construction, technology or the creative industries. In comparison, South Korea and Singapore provide more diversified education to train talent for different industries. This lack of diversity will affect the competitiveness of Hong Kong in the long term. (Yiu, 2018)

Similarly, in a report published in 2019, entitled *Applied education: A holistic, flexible education system for the digital age*, by the Our Hong Kong Foundation, a non-government, non-profit organization, proposes key policy recommendations targeted at enhancing the Hong Kong education system for the next generation (Yiu, 2018, p. 2). This Report, finds that, the key to delivering applied education at tertiary level lies in the creation of a new University of Applied Science provider category, as a distinctive *practically orientated degree-offering institution* (Yiu, 2018, p. 24).

> The ability to translate theory to impact, thus, to drive technological development, is the key reason for governments worldwide to promote UAS as an alternative in higher education. (Wong et al., 2019, p. 25)

From the Hong Kong SAR government perspective, a *Taskforce on the Promotion of Vocational and Professional Education and Training Review Report* (2020) prepared by the Taskforce included a recommendation to explore ways to facilitate the development of applied degrees at the Bachelor's degree level (Hong Kong Qualifications Framework level 5) characterized by features which include: flexible admission requirements; an applied focus; substantial work-based learning elements in the curriculum and strong industry involvement. A pilot project comprising selected degree programmes and providers has subsequently been facilitated. The pilot programmes commenced their respective developments in 2021 with a view to further enhancing and testing the modifications required to better support the development of a new generation of applied degrees.

Supporting these initiatives, a 2021 report, published by PricewaterhouseCoopers (PwC) Hong Kong, entitled, *Vocational and Professional Education and Training: Shaping the future of work*, reinforces the observation that vocational and professional education and training or VPET in Hong Kong has yet to be positioned on par with the conventional academic route in Hong Kong (Booker et al., 2021). The social and economic value proposition of the VPET sector to the Hong Kong SAR is presented, substantiated by quantitative data and qualitative findings. The report also makes key recommendations supporting the further development and positioning of VPET, including, redefining VPET as 'applied education; formalizing applied degrees and officially establishing a publicly funded University of Applied Science at the higher education level (Booker et al., 2021, p. 26) to complete the VPET value-chain.

1.6 Universities of Applied Sciences

In European countries such as Switzerland, Germany, Austria and Finland, the VPET sector has enjoyed a long and successful history of adopting an applied education approach. Universities of Applied Sciences (UAS) are well established in these countries, providing high quality professional education with an applied focus at bachelor's through to masters and doctoral levels with requisite support and input from the industries and professions.

In the countries that have UAS, it is widely acknowledged that the UAS fulfil a triple role:

1. Training and educating a highly skilled professional workforce;
2. Connecting to and supporting workforce needs and capabilities development, including an increasing focus on facilitating innovation, lifelong learning, sustainability, and social and regional engagement;
3. Undertaking applied-orientated, practice-based research that supports these endeavors. UAS research has a focus on practical applicability, is industry demand driven, collaborative and multi-disciplinary with a feed-back loop that incorporates the findings back into UAS programme curricula.

In educating and skilling future generations, the UAS work with the local and regional industries and professions to improve, innovate and enhance the development of these industries and professions and thereby drive economic value for the benefit of society at large. UAS study programs are based on industry demand analysis with graduate capabilities identified and curricula developed with significant input from the relevant industry stakeholders. This special form of cooperation between UAS and the industries and professions assures enhanced graduate employability.

Furthermore, the UAS sector addresses the increasing demands of the global knowledge economy with its pressing need for not only initial high-level skilling, but also for re-skilling and up-skilling, in essence, the need for life-long learning. This can be seen in the wide portfolio of practice-oriented modules for young and (more) mature students offered by UAS, through both full-time and part-time study programs.

1.7 Applied Degree Education: Shaping the Future of Work

Simply put, applied bachelor's degrees coupled with delivery through University of Applied Sciences and other similarly aligned higher education institutions around the world, have a strong focus on the development of applied workplace skills *in, with* and *for* specific industries and professional domains. In applied degree programmes internships, practicums, work or clinical placements, or work integrated learning as variously termed, are compulsory components of the para-professional student's vocational learning journey. These work-place based learning experiences are often inclusive of work-based assessment and in many jurisdictions are conducted by or contributed to, by trained workplace assessors. In many jurisdictions, applied degrees provide articulation pathways which build on sub-degree qualifications such diplomas, higher/advanced diplomas and associate degrees.

In the US, Cognizant's Centre for the Future of Work, surveyed 601 business executives at leading companies and 262 educational institutions globally to gain insights into the changes that are being made in education and training programmes to meet the challenges of preparing the future workforce. The research findings, published in *Relearning how we learn, from the campus to the workplace* (Bahl &

Cook, 2020) reiterates that jobs of the future will be defined by the new tools of the trade (AI, AR/VR, big data, IoT), and as such will have a significant impact on the future of work. Interestingly however, research findings indicate that only 25% of higher education students have the necessary skill base to work and interact with emerging digital technologies.

As previously described, world leaders now faced with the imperative to ensure re-industrialization and digitalization are adequately integrated to service the socio-economic development of their nations are increasingly making future work preparation a tertiary education sector priority. It is one that pragmatically requires a dramatic transformation and focus on applied education and applied learning. The applied degree sector will need to work in closer partnership with their industries and professions to more meaningfully integrate local, regional and global networks in an ecosystem approach, thereby ensuring the global relevancy and currency of advanced level skills, knowledge and applications as they prepare work ready, future ready graduates for the new world of work.

1.8 The Growing Imperative for Applied Skills-Based Education and Training

The predominant higher education paradigm has been the transmission of conventional academic wisdom, i.e., theoretical knowledge, of the relevant discipline. The pedagogical approaches in more conventional university settings have (and perhaps more stereotypically these days) highlighted professors literally, 'professing' as they lecture to and transmit academic content to undergraduates. If, as has been argued, higher level knowledge and advanced technological skills, competencies and attitudes, (i.e., the DELTAs) are the pre-requisites for successful workforce futures, then a gear-change also needs to occur that acknowledges and accords recognition of the value and the all-important parity of esteem between and within, the conventional higher education academic university provider and that of the higher education vocational and professional education applied degree provider.

Interestingly, the notion of what constitutes an applied skills provider, is also undergoing change. Given the demands for industry-ready graduates and perhaps in the wake of frustration at not being able to secure adequate pipeline talent for their industries, it has become increasingly common for larger corporations to establish their own academies or professional training and development pathways, some eventually even becoming degree-granting. The Dyson Institute for Engineering and Technology, for example, is a private institution based in Wiltshire, England. The Institute was established in 2017, by James Dyson as a direct result of his self-declared frustration over engineering training and skills shortage in the UK. Students are salaried employees of the Dyson Company and work 3-days a week while also having tuition-fees paid for during their 4-year course of study for the Bachelor of

Engineering. While the degree was initially awarded in partnership with the University of Warwick, the Dyson Institute received its own degree granting powers in 2021, making it the first alternate provider in the UK to receive this recognition (Adams, 2020).

While the Dyson Institute is a relatively recent entrant, of the so-called 'corporate university,' the earliest examples of its type, appeared more than 60 years ago. In the US, General Motors opened the first in the mid-1950s, while McDonald's Hamburger University debuted in 1961, and Disney University and Motorola University were set up in the 1970s. In China, momentum for enterprises to establish corporate universities became evident in the late 1990s and has since been gaining ground. In more recent years, social media and gaming technology giant Tencent, established Qingteng University and e-commerce giant Alibaba established Hupan University in 2015. However, in 2021 as a result of government directives, both Qingteng and Hupan removed the word 'university' from their titles and are now referred to as Qingteng and the Hupan Academy respectively. Another notable corporate includes, Meituan, China's largest food delivery platform which offers vocational training courses (Sharma, 2021).

In Hong Kong SAR, the rise of corporate academies has occurred relatively recently to offer in-house training certificates, diplomas and customized leadership programmes to build capabilities. These include but are not limited to: Mass Transit Railway (MTR) Academy, China Light and Power (CLP) Academy and Towngas Engineering Academy. Aside from qualifications orientated delivery, 'in-house' learning and development investment in employee retention, corporate social responsibility and the facilitation of outreach programmes which tap potential talent pipelines are increasingly common in national and multinational corporates, such as the four largest professional services companies in the world, collectively known as the *Big Four*—PricewaterhouseCoopers (PwC), Ernst and Young (EY), KPMG and Deloitte. Examples of large US-based corporations that have taken the lead and invested heavily into new skills development include, Amazon which recently pledged $US700 million to retrain 100,000 US-based employees for higher-skilled jobs in technology-related areas such as machine learning and data science. Similarly, JPMorgan Chase made a five-year, $US350 million commitment to develop technical skills, invest in community college and conduct research into job and career transition. And Walmart invested more than $US2 billion in wages and training programs, including Walmart Pathways, to educate entry-level employees including the development of valuable soft skills (Hancock et al., 2020).

Moreover, it is also worthy to note that online education programmes offered by service providers on a global scale have increased, particularly during the pandemic period. Utilising Massive Open Online Courses (MOOCs), providers such as Coursera, Udacity, EdX, FutureLearn, LinkedIn Learning and the Khan Academy, as well as tech corporates around the globe, such as Google Skillshop, Amazon Web Services Academy, and entrepreneurial EdTech start-ups provide just-in-time micro learning in the form of online test-based credentials, badges and certificates. The point here, is that the alternate online education and training space is booming, there is no shortage of learning and development opportunities for lifelong learners of

any age wishing to undertake micro-learning and micro-credentialing on any digital device anytime, anywhere. That said, these opportunities present a double-edged sword, on one edge as disruptive and highly competitive entities with massive global outreach to rival 'bricks and mortar' education and on the other, as useful added-value complements to the benefits of the more real-world and practical, 'hands-on' experiences of an applied degree education.

1.9 Increasing Stakeholder Traction and the Value-Add of Applied Degree Education

In a digitally enhanced workspace, there is a demand for graduates with strong digital competencies and applied skills in tandem with soft skills. Consequently, the applied degree aka the professional degree, with its balance of theoretical focus and career-orientated, practical work-integrated learning, are credentials with outcomes increasingly sought after by employers who welcome the opportunity to recruit job-ready graduates with advanced skill sets into their workplaces. Further, as the imperative for upskilling and reskilling increases, the opportunity for in-service employees to enter applied degrees is also made more flexible through the recognition of prior learning experiences including advanced standing and credit transfer.

The key point of difference between an applied degree and the more conventional 'academic' bachelor's degree, is that an applied degree provides students with the requisite practical and applied skills and knowledge to be significantly more "work-ready" in orientation in regard to a specified career pathway. Theoretical concepts are integrated with applied practice so that the acquisition of skills and knowledge enable their practice application relevant to the industry or professional role. In general, a more standard academic bachelor's degree is more theory-based and puts a strong focus on the content rather than the relevance it has to the current workforce. An applied degree relates very much to a matter of *approach,* regardless of whether the provider is a university, polytechnic or institute of technology or other higher education institute and the boundaries are indeed blurring. The differential is that the approach taken in curriculum delivery is very definitely towards not only the understanding of content knowledge in the field but also the acquisition of skills and the synthesis of both theory and skill through the application of this practice in authentic professional settings.

This applied practice approach includes therefore the more traditionally recognised 'academic' degree programmes that develop graduate outcomes for specific occupations or the so-termed *regulated professions*. These include, but are not limited to: construction and engineering, the built environment, medicine, dental and health care services, and education. Each of which anticipate some form of applied practice through work-based or work integrated learning, be it termed a clinical placement, practicum, internship or other project-based related real-world application and outcome. It is worthwhile to note that the end point credential or award of the applied

degree qualification can be variously titled. In some countries, an applied degree is the one that is prefaced in the titled as such, for example, the Bachelor of Applied Information Technology and the Bachelor of Applied Cloud Technology in Australia, or the Bachelor of Applied Science common in the Universities of Applied Science in Europe. Professional degree qualifications, those degrees commonly taught in the conventional university sector and across top tier academic research universities which utilize applied education learning and teaching approaches, tend to be titled with reference to their disciplinary fields of study, for example, Bachelor of Medicine, Bachelor of Dentistry, Bachelor of Civil Engineering and the like. The important 'take-away' here, is that applied degrees as a type, are also delivered within domain of the conventional academic university provider and do not sit exclusively within the domain of the vocational and professional education sector.

1.9.1 New Generation Degree Apprenticeships

The recent advent of new generation degree apprenticeships has increased the focus on applied degrees premised upon mutually beneficial work/study alignments, to benefit both the employee/student and the employer in terms of up-skilling and workplace talent development. In the UK, Australia and here in Hong Kong, degree apprenticeship programmes are gaining interest and traction from industry bodies and employers alike. In the US, apprenticeships are likewise being reviewed and revised. The new National Apprenticeship Act (2021–2022) is under consideration, which aims to earmark $US3 billion to expand and manage the effectiveness of apprenticeships and participation across industry sectors.

Whereas 'apprenticeship' schemes in the past have referred mainly to trades qualifications at the sub-degree diploma and higher diploma levels, the new generation degree apprenticeships reflect opportunities to 'earn and learn' across a broad spectrum of professional domains. It is also worthwhile to note that these new generation apprenticeships, e.g., in the UK, may be undertaken at undergraduate bachelor's degree level, but also at post-graduate master's degree level. While a degree apprenticeship requires determination and perseverance on behalf of the student/employee and some resource and time investment for the employer in working with degree providers to embed work-based assessment and mentorship, overall, the cost benefit in the tripartite relationship has been found to be beneficial (Morley, 2018). In the UK, an All-Party Parliamentary Group (APPG) on Apprenticeships (2021) reviewing the implementation of the modern apprenticeship in the UK found that apprenticeships are a 'fantastic way to upskill, diversify and re-skill the workforce, ensuring businesses continue to grow as they give essential capabilities to employees' (Report, Foreword). Further, the Report finds that:

> Degree apprenticeships are growing in popularity as they allow students to learn both theoretically and vocationally, earn a salary and develop work skills, whilst gaining a high-level qualification. Degree apprenticeships are increasingly being seen as viable options